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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
JIN LI

Serial No.: 09/753,343

Filed: DECEMBER 29, 2000

For: METHOD AND APPARATUS FOR DETECTING LINE CARD THRESHHOLD

Group Art Unit: 2644

Examiner: JEFFEREY F. HAROLD

Conf. No.: 2045

Atty. Dkt.: 2069.009900/TT3841

CUSTOMER NO.: 23720

APPEAL BRIEF

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8	
DATE OF DEPOSIT:	April 8, 2005
I hereby certify that this paper or fee is being deposited with the United States Postal Service with sufficient postage as "FIRST CLASS MAIL" addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. Nancy Nolan Signature	

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

On February 9, 2005, Appellant filed a Notice of Appeal in response to a Final Office Action dated June 4, 2004, issued in connection with the above-identified application. In support of the appeal, Appellant hereby submits this Appeal Brief to the Board of Patent Appeals and Interferences.

The two-month date for filing this Appeal Brief is April 9, 2005. Since this Appeal Brief is being filed on April 8, 2005, this paper is believed to be timely filed. **The Director is authorized to deduct the fee for filing this Appeal Brief ($500.00) from Legerity, Inc. Deposit Account No. 50-1591/TT3841.** In the event the monies in that account are insufficient,

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the Commissioner is authorized to withdraw funds from Williams, Morgan & Amerson, P.C. Deposit Account No. 50-0786/2069.009900/TT3841.

I. REAL PARTY IN INTEREST

The present application is owned by Legerity, Inc.

II. RELATED APPEALS AND INTERFERENCES

Appellant is not aware of any related appeals and/or interferences that might affect the outcome of this proceeding.

III. STATUS OF THE CLAIMS

Claims 1-30, are pending in the application. Claims 1, 2, 4, 5, 9-15, 19-22, and 24-26 stand rejected, and claims 3, 6-8, 16-18, 23, 27-30 stand objected to because they depend from a rejected independent claim. The rejected claims 1, 2, 4, 5, 9-15, 19-22, and 24-26 are the subject of this appeal. For convenience, all of the pending claims 1-30 (including those objected to) are attached as Appendix A.

IV. STATUS OF AMENDMENTS

After the Final Rejection, no claim amendments have been made.

V. SUMMARY OF THE INVENTION

The present application is generally directed to the field of telecommunications, and, more particularly, to a method and apparatus for ring-trip detection or fault detection in a line card. *See* Patent Application, page 2, lines 5-8.

In communications systems, particularly telephony, it is a common practice to transmit signals between a subscriber station and a central switching office via a two-wire bi-directional communication channel. *See* Patent Application, page 2, lines 11-13. A line card generally connects the subscriber station to the central switching office through a subscriber line. *Id.* at lines13-14. At the subscriber end, a telephonic device may be employed to establish communication with a remote user using the subscriber line. *Id.* at lines 14-15. The combination of the telephonic device and the subscriber line is commonly referred to as a subscriber loop. *Id.* at lines 15-17.

A line card generally includes at least one subscriber line interface circuit (SLIC) as well as a subscriber line audio-processing circuit (SLAC). *Id.* at lines 19-20. The SLIC interfaces with the subscriber loop, and the SLAC interfaces with the SLIC. *Id.* at lines 20-21. The SLIC and the SLAC carry out the well-known BORSCHT (Battery feed, Overvoltage protection, Ringing, Supervision, Coding, Hybrid, and Test) functions. *Id.* at lines 21-23.

Typically, when an end user initiates a call, the line card provides a ringing AC ringing signal and, often, a DC bias signal to the subscriber loop to ring the telephonic device. *Id.* at page 3, lines 1-2. In the United States, the AC ringing signal generally varies from a 16 Hz to 66-2/3 Hz, although a 20 Hz signal is commonly used. *Id.* at lines 2-4. Other countries may employ a ringing signal of a different frequency than that of the ringing signal employed in the United States. *Id.* at lines 4-6. For example, in European countries, the ringing signal is 25 Hz. The ringing signal can either be internally or externally generated. *Id.* at lines 6-7.

While applying the ringing signal to the subscriber loop, the line card also detects an off-hook condition of the telephonic device. *Id.* at lines 9-10. Upon detection of an off-hook event, the line card terminates the transmission of the ringing signals within a predetermined amount of time, which is generally within 200 ms of detecting the off-hook condition. *Id.* at lines 10-12. The process of transmitting a ringing signal and then detecting the switch-hook condition of the telephonic device is referred to as ring-trip detection. *Id.* at lines 12-14.

Aside from ring-trip detection, line cards perform a variety of other key functions using signals of varying frequency. *Id.* at lines 16-17. One such function is AC-fault detection. *Id.* The purpose of AC-fault detection is to ensure that there are no undesirable interrupts caused by an AC disturbance signal, such as a power line signal or a rail system signal. *Id.* at lines 17-19. For AC-fault detection, line cards employ a signal having a frequency of 16.67 Hz, 50 Hz, or 60 Hz. *Id.* at lines 19-20.

The patent application explains that to perform ring-trip detection or AC-fault detection, conventional line cards transmit a signal to the subscriber loop and then estimate a power of a received signal. *See* patent application, page 3, line 22 – page 4, line 2. But to determine power, it is desirable to know a period (or frequency) of the received signal. *Id.* at page 4, lines 4-5. However, as noted in the patent specification, because different countries employ different frequency signals (*e.g.,* in the US, a 20Hz ringing signal is employed, and in Europe a 25 Hz signal is employed), knowing the frequency of the received signal is problematic. *See Id.* at lines 10-18. Thus, to determine the power, the patent specification explains that the prior art systems estimated the frequency of the received signal. *Id.* at lines 14-15 (stating "[t]o account for the

different frequency requirements, one method employed by designers is to calculate power based on a compromise between the various frequencies"). (emphasis supplied). For example, for ring-trip detection, line cards utilize an integration time of 44 ms, which correlates to a signal having a frequency of 22.5 Hz, an average of a 20 Hz signal (i.*e.,* frequency commonly employed in U.S.) and 25 Hz signal (*i.e.,* frequency utilized in European countries). *Id.* at lines 15-18. Thus, the ring-trip detection under this method is based on a period of 44 milliseconds. *Id.* at lines 18-19. This method of utilizing a compromising integration time for ring-trip detection, for example, may result in at least 10% false detections. *Id.* at page 5, line 21 – page 6, line 2.

One or more embodiments of the present invention are directed to addressing, or at least reducing the effects of, one or more of the problems set forth above. In general, the described embodiments are directed to a method and apparatus for determining a period of a received AC signal from a subscriber line and performing a line card function, such as, for example, ring trip detection and AC fault detection. *See, e.g.,* Figure 4 and accompanying description at pages 20-21. By determining the period (and thus the frequency, if desired) of the received AC signal, it is possible to more accurately perform the power calculation, at least in comparison to the conventional approach, where instead of measuring the received signal, a pre-defined extrapolated value is utilized to calculate a power of a received signal. *Id.* at page 31, lines 13-16; *see also* pages 4-5 (stating that conventional systems can result, for example, in at least 10% false detections).

Against this backdrop, the claims are specifically addressed below. The additional details regarding the described embodiments are provided in the patent application.

VI. ISSUE ON APPEAL

1. Whether claims 1, 4, 11, 14 and 26 are anticipated by U.S. Patent No. 6,219,417 (***Zhou***)?

2. Whether claims 5, 15, 21, and 22 are anticipated by U.S. Patent No. 6,219,417 (***Zhou***)?

3. Whether claims 2 and 12 are anticipated by U.S. Patent No. 6,219,417 (***Zhou***)?

4. Whether claims 9, 19, and 24 are anticipated by U.S. Patent No. 6,219,417 (***Zhou***)?

5. Whether claims 10, 20, and 25 are anticipated by U.S. Patent No. 6,219,417 (***Zhou***)?

6. Whether claim 13 is anticipated by U.S. Patent No. 6,219,417 (***Zhou***)?

VII. GROUPING OF THE CLAIMS

Claims 1, 4, 11, 14 and 26 are grouped together (Group I), and stand or fall together; claims 5, 15, 21, and 22 are grouped together (Group II), and stand or fall together; claims 2 and 12 are grouped together (Group III); claims 9, 19, and 24 are grouped together (Group IV), and stand or fall together; claims 10, 20, and 25 are grouped together (Group V), and stand or fall together; claim 13 is in a group (Group VI) by itself.

VIII. ARGUMENT

The Examiner has rejected the Group I – Group VI claims as being anticipated by U.S. Patent No. 6,219,417 (***Zhou***). In particular, the Examiner maintains that one column from ***Zhou*** (from col. 11, line 13 – col. 12, line 13, in association with Figures 7 and 9) discloses each and every single feature of the rejected claims. To this extent, for each rejected claim, the Examiner simply repeats the above-citation as his basis for rejection at the end of each claim. *See* Final Office Action. Although the rejected claims, including the dependent claims, recite unique patentable features, the Examiner unfortunately does not even attempt to show how ***Zhou*** is specifically applied to the claims. Instead, as noted, the Examiner merely repeats over and over the same citation (*i.e.,* cols. 11-12) from ***Zhou***. A review of the cited passage and other portion of ***Zhou***, however, reveals that ***Zhou*** does not disclose or teach one or more of the claimed features.

The specific claims of the present invention are discussed below.

A. Group I Claims Are Not Anticipated by Zhou

Group I claims 1, 4, 11, 14 and 26 are patentable over ***Zhou***. Consider claim 1, for example. Claim 1 is directed to a method that calls for transmitting a signal having an AC component to a subscriber line and receiving at least a portion of the transmitted signal from the subscriber line. Claim 1 further calls for determining at least a portion of a period of the AC component based on the received signal. Claim 1 further calls for performing a function (*e.g.,* ring-trip detection or AC fault detection) of a line card in response to determining at least the portion of the period of the AC component. The Applicant does not suggest that claim 1 is

limited to performing ring-trip detection or AC fault detection, rather, the Applicant provides these type of detections as examples for illustrative purposes.

Zhou is directed to ring trip detection in a communication system. The Examiner asserts that text at col. 11, line 13 through col. 12, line 13 of ***Zhou*** teaches features of claim 1. *See,* pages 2-3 of the Office Action. The Applicant respectfully disagrees. ***Zhou*** at least does not teach determining at least a portion of a period of the AC component based on the received signal. Nothing in ***Zhou***, and certainly nothing in the passage cited by the Examiner (col. 11-12), teaches or discloses this claimed feature. The text cited by the Examiner from ***Zhou*** teaches that operation 912 determines whether the current in subscriber loop 302 has changed by more than the predetermined short circuit threshold. ***Zhou***, col. 11, lines 25-27. This text simply describes whether the measured loop current has changed by a threshold amount, and thus does not teach determining a period of the received signal. ***Zhou*** further discloses that the "predetermined short circuit threshold" is chosen to detect a 4 kHz sampled current change due to a short circuit condition in the subscriber loop 302 while discriminating against current changes due to a ringing signal. This passage also does not teach determining a period of the received signal. As the Applicants describe in the patent application, by determining the period (or, alternatively, the frequency) of the AC component, it is possible to calculate the power with higher precision. *See* Patent Application, page 21, lines 14-15. And, with higher precision, it is possible to more accurately perform line card functions, such as ring-trip detection and fault detection. *Id.* lines 15-16.

Zhou teaches determining ring-trip detection through the use of an IIR filter 920. ***Zhou***, col. 11, lines 46-49; *see also* col. 11, line 61 – col. 12, line 5 (stating the output data signal of the IIR filter 920 is compared to a predetermined, programmable threshold to allow ring trip

detection). Thus, even in the context of ring-trip detection, ***Zhou*** does not teach determining at least a portion of a period of the AC component based on the received signal. Accordingly, for at least this reason, claim 1 is allowable.

Claim 1 is allowable for an additional reason in that it also calls for performing a function of a line card in response to determining at least the portion of the period of the AC component. In this case, because ***Zhou*** does not teach determining a portion of a period of the AC component, it also does not teach the claimed feature of performing a function of the line card, as called for by claim 1. Thus, claim 1 is allowable for this additional reason.

The remaining claims in Group I are also allowable for one or more of the reasons presented above. Claim 26 includes various elements in means-plus-function elements. The Applicants assert that this claim is distinguishable from ***Zhou*** based on the recited functions alone. That is, the Applicants assert that the Examiner has failed to show that ***Zhou*** teaches all of the recited functions, much less the means associated with such functions. Thus, the Applicants rely on the recited functions to distinguish the cited reference. Accordingly, the issue regarding the disclosed structure corresponding to the means need not be addressed to distinguish ***Zhou.***

B. Group II Claims Are Not Anticipated by Zhou

Group II claims (claims 5, 15, 21, and 22), in part, call for determining a value proportional to **a power** of the AC component of the received signal over at least a portion of a period of the AC component. These claims further call for performing a function (e.g., executing a feature) of a line card in response to determining the value proportional to **the power** of the AC

component. In ***Zhou***, the ring-trip detection is based on applying a direct current to the subscriber loop and then detecting a change in the current in the subscriber loop. ***Zhou***, col. 3, line 63 – col. 4, line 11. Thus, ***Zhou*** does not teach or disclose determining a value proportional to the power of the AC component. For at least this reason, Group II claims are allowable. Moreover, ***Zhou*** also does not teach determining the value over at least a portion of a period of the AC component.

Group II claims are also allowable for an additional reason in that ***Zhou*** does not teach or disclose performing a function of a line card in response to determining the value proportional to **the power** of the AC component. As noted, because ***Zhou*** does not teach determining a value proportional to the power of the AC component, it also does not teach the "performing" claimed feature. Thus, claims in Group II are allowable for this additional reason.

C. Group III Claims Are Not Anticipated by Zhou

Group III claims (claims 2 and 12) are also allowable over ***Zhou***. These claims at least specify that the act of "performing the function" (recited in the respective independent claims) comprises performing ring-trip detection. Thus, when construed in light of their respective independent claims, claims 2 and 12 call for performing ring trip detection in response to determining at least the portion of the period of the AC component. However, as discussed above with respect to Group I claims, the ring-trip detection in ***Zhou*** is not performed in response to determining at least the portion of the period of the AC component. Rather, ***Zhou*** teaches determining ring-trip detection through the use of an IIR filter 920. ***Zhou***, col. 11, lines 46-49; *see also* col. 11, line 61 – col. 12, line 5 (stating the output data signal of the IIR filter 920

is compared to a predetermined, programmable threshold to allow ring trip detection). Accordingly, for at least this reason, the Group III claims are allowable.

D. Group IV Claims Are Not Anticipated by Zhou

Group IV claims (claims 9, 19, and 24) are also allowable over ***Zhou***. These claims at least specify that the act of "performing the function" (recited in the respective independent claims) comprises performing ring-trip detection. Thus, when construed in light of their respective independent claims, claims 9, 19, 24 call for performing ring trip detection performing a function of a line card in response to determining the value proportional to the power of the AC component. However, as discussed above with respect to Group I claims, the ring-trip detection in ***Zhou*** is not performed in response to determining the value proportional to the power of the AC component. Rather, in ***Zhou***, the ring-trip detection is based on applying a direct current to the subscriber loop and then detecting a change in the current in the subscriber loop. ***Zhou***, col. 3, line 63 – col. 4, line 11. Thus, ***Zhou*** does not teach or disclose determining a value proportional to the power of the AC component. For at least this reason, Group IV claims are allowable.

E. Group V Claims Are Not Anticipated by Zhou

Group V claims (claims 10, 20, and 25) are also allowable over ***Zhou***. These claims at least specify that the act of "performing the function" (recited in the respective independent claims) comprises performing AC-fault detection. Thus, when construed in light of the independent claims from which they respectively depend, claims 10, 20, and 25 call for performing an AC-fault detection relating to a line card in response to determining the value proportional to the power of the AC component. While ***Zhou*** makes reference to a fault

detection module 702 in Figure 7, it does not teach performing the fault detection in response to determining the value proportional to the power of the AC component. Rather, ***Zhou*** simply states that fault detection may be performed by module 702. ***Zhou***, col. 10, lines 57–59. Thus, ***Zhou*** does not teach the claimed feature of Group V claims. For at least this reason, Group V claims are allowable.

F. Group VI Claim Is Not Anticipated by Zhou

Group VI claim, claim 13, is also allowable over ***Zhou***. This claim at least specifies that the act of "performing the function" (recited in its independent claim) comprises performing AC-fault detection. Thus, when construed in light of its independent claim, claim 13 calls for a performing AC-fault detection relating to a line card in response to determining at least the portion of the period of the AC component. While ***Zhou*** makes reference to a fault detection module 702 in Figure 7, it does not teach performing the fault detection in response to determining at least the portion of the period of the AC component. Rather, ***Zhou*** simply states that fault detection may be performed by module 702. ***Zhou***, col. 10, lines 57–59. Thus, ***Zhou*** does not teach the claimed feature of Group VI claim. For at least this reason, Group VI claim is allowable.

IX. CONCLUSION

In view of the foregoing, it is respectfully submitted that the Examiner erred in not allowing all claims pending in the present application, Group I-VI claims, over the prior art of record. The undersigned attorney may be contacted at (713) 934-4064 with respect to any questions, comments, or suggestions relating to this appeal.

Respectfully submitted,

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APPENDIX A

1. (Previously presented) A method, comprising:

transmitting a signal having an AC component to a subscriber line;

receiving at least a portion of the transmitted signal from the subscriber line;

determining at least a portion of a period of the AC component based on the received signal; and

performing a function of a line card in response to determining at least the portion of the period of the AC component.

2. (Previously presented) The method of claim 1, wherein the signal is a ringing signal and wherein performing the function includes at least one of performing ring-trip detection and performing AC-fault detection.

3. (Previously presented) The method of claim 1, further comprising calculating a squared value of the AC component over the determined portion of the period.

4. (Original) The method of claim 1, wherein determining at least the portion of the period includes determining at least one zero crossing of the AC component.

5. (Original) A method, comprising:

transmitting a signal having at least one of an AC component and a DC component to a subscriber line;

receiving at least a portion of the transmitted signal from the subscriber line;

filtering the DC component from the received signal;

determining a value proportional to a power of the AC component of the received signal over at least a portion of a period of the AC component; and

performing a function of a line card in response to determining the value proportional to the power of the AC component.

6. (Previously presented) The method of claim 5, wherein determining the value proportional to the power of the AC component includes calculating a squared value of the AC component for at least the portion of the period.

7. (Original) The method of claim 6, wherein determining at least a portion of a period includes determining at least the portion of the period using zero crossing.

8. (Original) The method of claim 6, wherein the squared value of the AC component is calculated until the squared value is at least equal to a threshold value.

9. (Original) The method of claim 5, wherein the signal is a ringing signal and wherein performing the function includes performing ring-trip detection.

10. (Original) The method of claim 5, wherein the signal is a fault detection signal and wherein performing the function includes performing AC-fault detection.

11. (Previously presented) An apparatus, comprising:

circuitry capable of:

transmitting a signal having an AC component to a subscriber line; and

receiving at least a portion of the transmitted signal from the subscriber line;

a digital signal processor capable of determining at least a portion of a period of the AC component based on the received signal; and

the circuitry further capable of performing a function of a line card in response to determining at least the portion of the period of the AC component.

12. (Previously presented) The apparatus of claim 11, wherein the signal is a ringing signal and wherein the circuitry capable of performing the function includes the fault detection circuitry capable of performing ring-trip detection.

13. (Previously presented) The apparatus of claim 11, wherein the signal is a fault detection signal and wherein the circuitry capable of performing the function includes the fault detection circuitry capable of performing AC-fault detection.

14. (Previously presented) The apparatus of claim 11, wherein the digital signal processor capable of determining at least a portion of a period includes the digital signal processor capable of determining at least one zero crossing of the AC component.

15. (Previously presented) An apparatus, comprising:

circuitry capable of:

transmitting a signal having at least one of an AC component and a DC component to a subscriber line; and

receiving at least a portion of the transmitted signal from the subscriber line;

a filter capable of filtering the DC component from the received signal;

a digital signal processor capable of determining a value proportional to a power of the AC component of the received signal over at least a portion of a period of the AC component; and

the circuitry further capable of performing a function of a line card in response to determining the value proportional to the power of the AC component.

16. (Previously presented) The apparatus of claim 15, wherein the digital signal processor capable of determining the value proportional to the power of the AC component includes the digital signal processor capable of calculating a squared value of the AC component for at least the portion of the period.

17. (Original) The apparatus of claim 15, wherein the squared value is computed until it is at least equal to a threshold value.

18. (Original) The apparatus of claim 16, wherein determining at least the portion of the period includes determining at least the portion of the period using zero crossing.

19. (Original) The apparatus of claim 15, wherein the signal is a ringing signal and wherein performing the function includes performing ring-trip detection.

20. (Original) The apparatus of claim 15, wherein the signal is a fault detection signal and wherein performing the function includes performing AC-fault detection.

21. (Previously presented) A line card, comprising:

a subscriber line interface circuit capable of:

transmitting a signal having at least one of an AC component and a DC component to a subscriber line; and

receiving at least a portion of the transmitted signal from the subscriber line;

a filter capable of filtering the DC component from the received signal;

a digital signal processor capable of determining a value proportional to a power of the AC component of the received signal over at least a portion of a period of the AC component; and

the subscriber line interface circuit further capable of performing a function of a line card in response to determining the value proportional to the power of the AC component.

22. (Original) The line card of claim 21, wherein the subscriber line interface circuit is a voltage subscriber line interface circuit.

23. (Previously presented) The line card of claim 21, wherein the digital signal processor capable of determining the value proportional to the power of the AC component includes the digital signal processor capable of calculating a squared value of the AC component for at least the portion of the period.

24. (Original) The apparatus of claim 21, wherein the signal is a ringing signal and wherein performing the function includes performing ring-trip detection.

25. (Original) The apparatus of claim 21, wherein the signal is a fault detection signal and wherein performing the function includes performing AC-fault detection.

26. (Previously presented) An apparatus, comprising:

means for transmitting a signal having an AC component to a subscriber line;

means for receiving at least a portion of the transmitted signal from the subscriber line;

means for determining at least a portion of a period of the AC component based on the received signal; and

means for performing a function of a line card in response to determining at least the portion of the period of the AC component.

27. (Previously presented) The method of claim 3, wherein the AC component represents AC current, and wherein calculating the squared value comprises calculating the squared value of AC the current.

28. (Previously presented) The method of claim 5, wherein the AC component represents AC current, wherein determining the value proportional to the power comprises determining a squared value of the AC current.

29. (Previously presented) The method of claim 11, further comprising calculating a squared value of the AC component over the determined portion of the period.

30. (Previously presented) The method of claim 16, wherein the AC component represents AC current, wherein calculating the squared value comprises calculating the squared value of the AC current.